



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

National Remedy Review Board

OU5 Area 4

Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site

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EGLE-RRD-Superfund

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EGLE's Project Team- Who Area We?

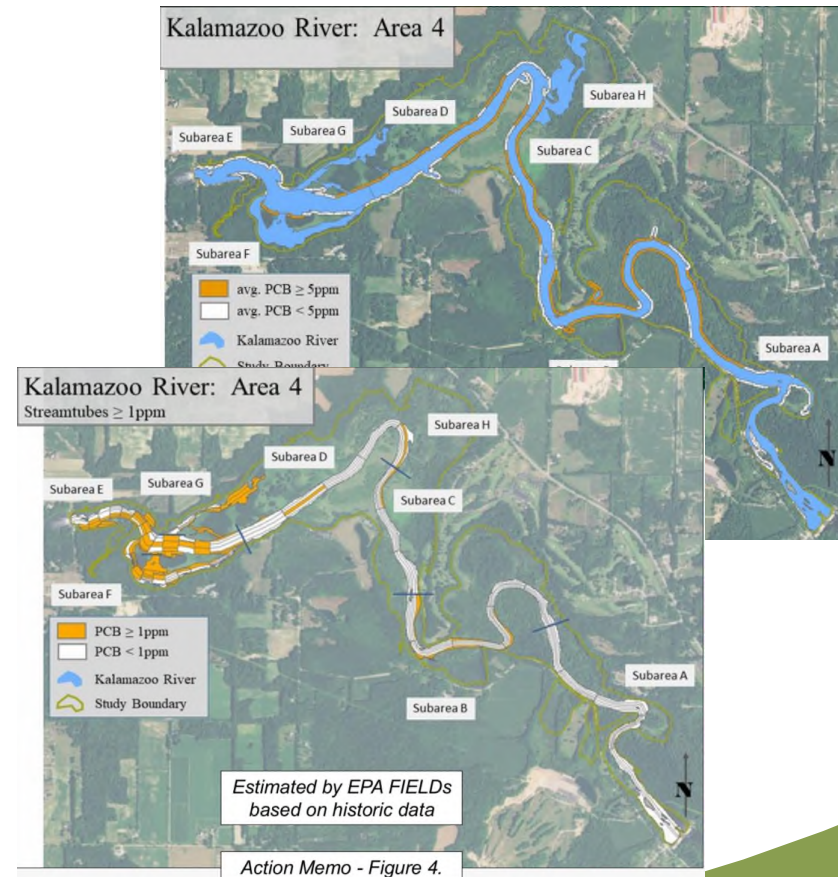
- Daniel Peabody, Project Manager for EGLE since 2017. Prior to that I was a field geologist at EGLE working primarily on contaminated sediment sites.
- CDM Smith and Kern Statistical Services has provided support to EGLE on OU5 for nearly 20 years.
 - ***Mr. Dan Cooke-** Risk Assessment Discipline Leader at CDM Smith. Provides technical support to EGLE for Human Health and Ecological Risk Assessments.
 - **Dr. Keegan Roberts-** Contaminated Sediments Discipline Leader at CDM Smith. Provides technical support to EGLE for all work completed as part of the SRI/FS and RD/RA processes.
 - **Dr. John Kern-** Owner, Kern Statistical Services Inc. Provides technical support to EGLE for all work completed as part of the SRI/FS and RD/RA processes, particularly those aspects related to design of sampling programs and analysis of biotic and abiotic data.
- State stakeholder team includes staff and managers in MDNR (Wildlife and Fisheries) and EGLE (Water Resources and Materials Management), and the NRDA Trustees.
 - Other stakeholders: CAG and other public interest groups, local Tribes (Gun Lake), Responsible Parties, Local Units of Government, Private Property Owners.

Structure and Content of EGLE's Supporting Technical Write-up & Presentation Format

- EGLE submitted a 10 page write-up that is a summary of comments and work products that we have authored throughout the duration of the SRI/FS process for Area 4, which has been ongoing since at least 2014.
 - The comments in our write-up are structured to match how the Alternatives for the FS would be developed, which are generally based on spatial location and media of interest.
 - “Trowbridge Dam Area TCRA”; Sediments Outside the “Trowbridge Dam Area”, and; “Floodplain Soils”.
 - Where applicable and when possible, citations in the text are provided along with weblinks to documents that are available online which includes some but not all the references that are made.
 - If there are documents that are needed but are not available online EGLE would be willing to provide them, if requested. Email: peabodyd@mi.gov
- The presentation will touch on issues that are discussed in greater detail in the write-up that was provided and leave room for conversation at the end.
 - Our technical experts are here to help support conversations and provide additional background on comments and work products, as necessary.

“Trowbridge Dam Area” TCRA

- Background & Status
 - Action Memorandum (AM) signed in April 2020 for TCRA over the lower 2.4 miles of Area 4
 - Includes excavation of contaminated bank soils (>5ppm) and sediments (>1ppm PCB), and removal of the State-owned dam.
 - Design process is ongoing. Revised designs received in late August and comments are due in late Sept.
 - Given the uncertainty in the outcome I will only briefly touch on our concerns about the TCRA as they relate to the overall remedy.
- Concerns:
 - The spatial footprint of the TCRA has been significantly reduced relative to what is shown in the AM, and Alternatives for the AM footprint are not being scoped as part of the FS.
 - The design, if implemented, will not achieve State programmatic standards.
 - The design includes the discharge of an *unnatural* quantity of contaminated sediments and the reuse/disposal of PCB contaminated materials in the TCRA footprint and on adjacent State-owned property.
 - The design, if implemented, will create potentially unsafe conditions for recreators.
 - Current influence of dam extends outside of “Trowbridge Dam Area”
 - The design relies on hard armor to dissipate energy and, if implemented, will create an *unnatural* and *unstable* condition that provides minimal ecological benefit.
 - We do not support the reuse or disposal of PCB contaminated material in the TCRA footprint or on adjacent State-managed land.
 - Differences in State/public participation in removal vs. remedial actions.
 - We’ve seen a wide-range of outcomes in abiotic and biotic media following a removal action, and recovery projections for biotic media that are made are aggressive and may be unrealistic.



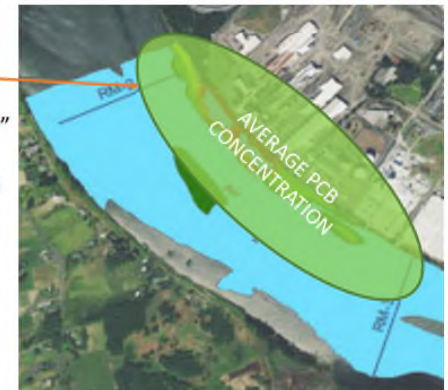
Sediment Alternatives Outside the “Trowbridge Dam Area” - Background

- A Total PCB (TPCB) surface-area weighted average concentration (SWAC) of 0.33 parts-per-million (ppm) is the proposed Preliminary Remediation Goal (PRG) to be applied as a clean-up level (CUL) over the entirety of Area 4 and achieved overtime.
 - 0.33ppm TPCB PRG is based on a historic (late 1990s) analytical detection limit
- Sediment SWACs for TPCBs were calculated for the eight sediment subareas, including five in the main channel (Subareas A through E), based on distinct dam-in geomorphological characteristics, the spatial distribution of PCBs in sediments, bank and floodplain soils, and areas of floodplain inundation.
- Two RAOs proposed for Area 4 (RAO 1 and RAO2) utilize resident fish (adult and young-of-year smallmouth bass [SMB]) as the receptor, both RAOs are achieved through removal of contaminated sediments and attainment of the 0.33 ppm PRG for TPCBs.

Terms

SWAC (Surface-weighted average concentrations). The average concentration of the exposure area.

Cleanup Level (CUL). The “protective” sediment concentration. (The sediment contaminant concentration [measured as a SWAC] in the exposure area that equates to the acceptable level in fish).



Sediment Alternatives Outside the “Trowbridge Dam Area” - Discussion

- RAO1 and RAO 2 utilize resident SMB as the receptor.
 - YOY: 79mm to 119mm
 - Adult 254mm to 356 mm
- No site-specific studies have been conducted to look at movement of SMB within the Superfund site and a “homerange” has not been considered or developed for SMB.
 - Literature suggest the SMB movements in riverine systems is generally limited- with “home ranges” on the order of tens to hundreds of meters- and SMB may respect stream features as boundaries.
- Two RAOs proposed for Area 4 (RAO 1 and RAO2) utilize resident fish (adult and young-of-year smallmouth bass) as the receptor, both RAOs are achieved through removal of contaminated sediments and attainment of the 0.33 ppm PRG for TPCBs.

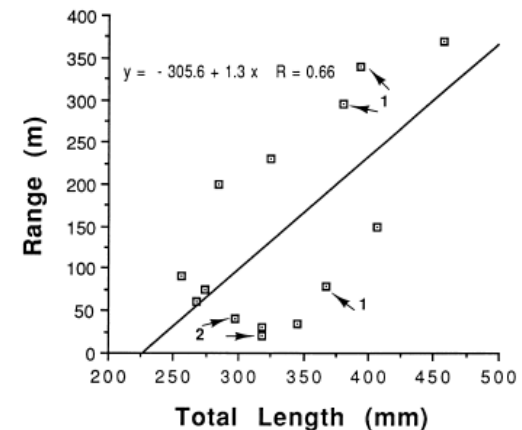


Figure 4. The relationship between total length and total range size for smallmouth bass tracked between May 1988 and November 1989. Each point represents either a spring/summer or fall/winter range. Two fish (1 and 2) were tracked for longer than one season; lengths were estimated for a typical growing season.

Floodplain Alternatives- Mapping the TPCB and TTEQ Remedial Footprints

- TPCB Remedial Footprint
 - Ordinary Kriging (OK) and Natural Neighbor (NN) models were applied to the SRI-only and RI+SRI data
 - RPs expressed desire and plan to censor or qualify existing RI-dataset during FS/RD which would either remove or artificially bias approximately 25% of the data set collected and relied upon within Area 4, which was almost exclusively collected by RPs.
 - EGLE's analysis identified fundamental flaws in the underlying OK statistics and our position is that model should not be relied upon for decision making.
 - The NN model is more likely to accurately represent field conditions because it preserves short scale continuity.

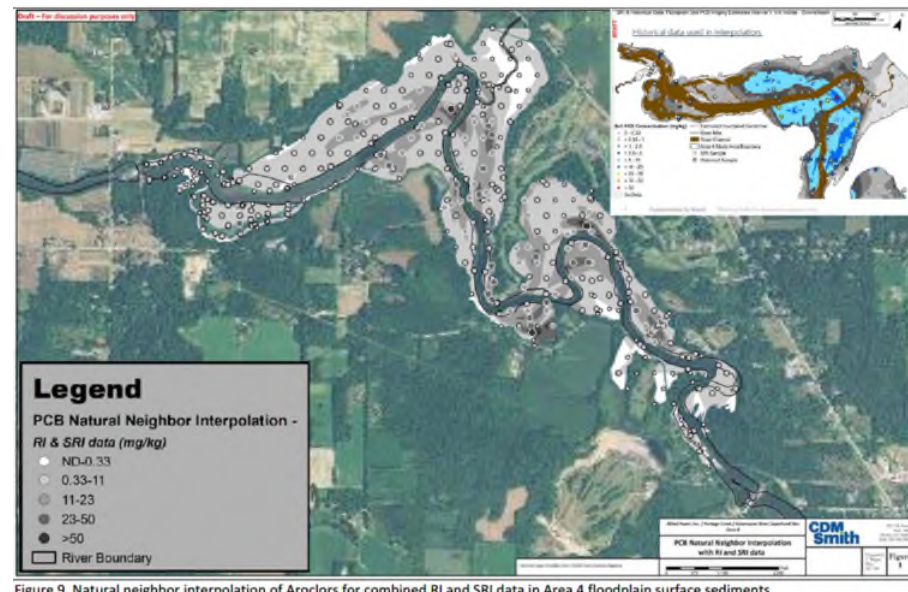


Figure 9. Natural neighbor interpolation of Aroclors for combined RI and SRI data in Area 4 floodplain surface sediments. model was 54.6 acres based solely on the uncorrected SRI data.

Floodplain Alternatives- Mapping the TPCB and TTEQ Remedial Footprints

- TTEQ Remedial Footprint

- In Area 4 ecological exposure to TTEQ is a secondary but significant risk to terrestrial receptors and TTEQ risks extend outside of footprint developed for TPCBs, so it is necessary to incorporate a terrestrial baseline ecological risk.
- The SRI and ASTM use a limited number of sample locations (55) to interpolate TTEQ concentrations over an area of more than 489 acres.
 - The approach being applied refuses to acknowledge that that sparsely sampled TEQ values can be leveraged by exploiting the relatively strong ($R^2=0.91$) relationship between TEQ and PCBs which were measured at much more dense spatial scale.
 - EGLE (formerly MDEQ) developed statistical relationships between co-located TPCBs and TTEQ, and preliminary uncertainty analysis, and presented this to the USEPA and the RPs early on in the development of the Area 4 SRI Report.
- The FS should provide evidence of the assumed spatial correlation in TEQ measurements is adequate to support the interpolations, and there should be a quantitative evaluation aimed at estimating the uncertainties in the mapped footprints based solely on the TEQ measurements versus those based on a combination of measured TEQs and estimated TEQs based on tPCBs.
 - Data could also be integrated using co-kriging

Kalamazoo River Area 4 EGLE Approach	
Acres above Total TEQ Threshold Mammalian 0-12"	
Total TEQ (ng/kg)	Acres Above Total TEQ
<200	230
201-400	44
401-800	81
>800	92

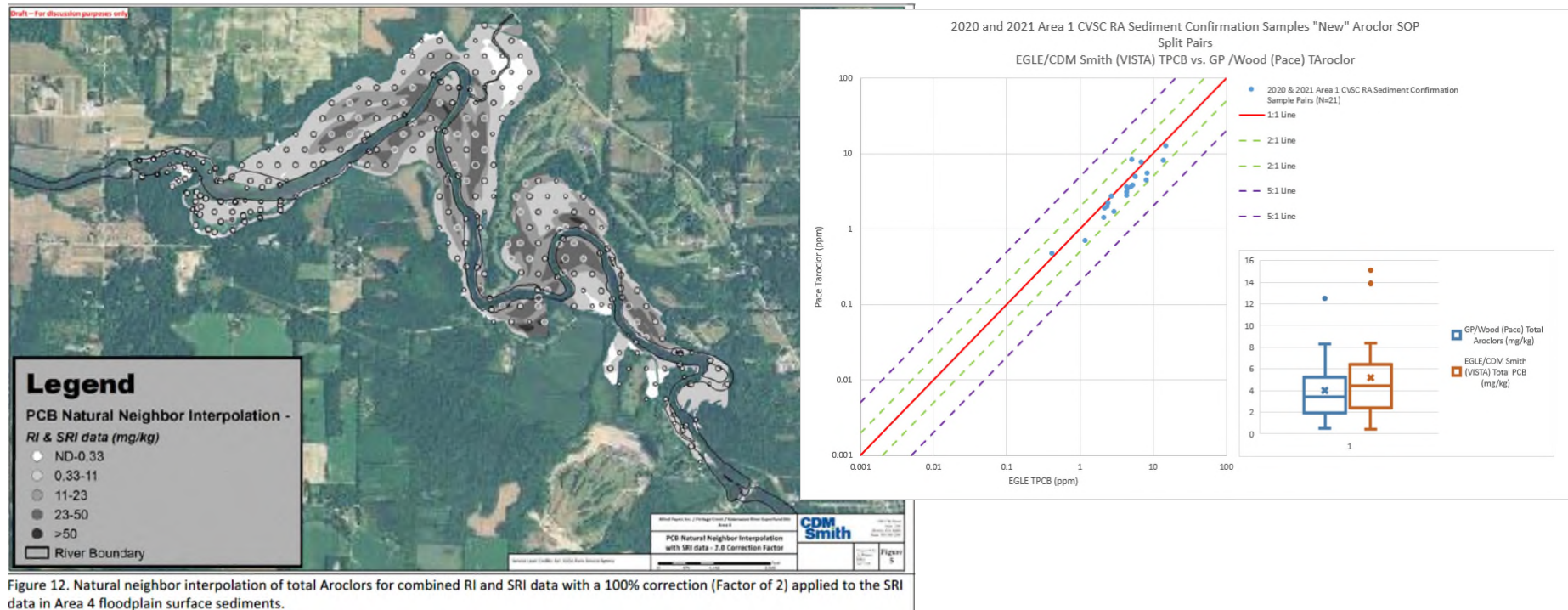
TEQ=exp(4.453) x tPCB*1.015

**Kalamazoo River Area 4 ASTM
Acres above Total TEQ
Threshold, Mammalian 0-12"**

Total TEQ (ng/kg)	Acres Above Total TEQ
250	272.6
420	187.6
500	145.0
750	23.4
840	8.5
1000	3.2
1250	0.6
1471	0.0

Prepared by: SCA 3/6/2019
Checked by: EMT 3/6/2019

The Compounding Issue of PCB Bias



The Compounding Issue of PCB Bias cont..

- An Action Memorandum for a TCRA in Area 3 was issued in April 2016 and assumed a total volume of 120,000 yd³ of PCB contaminated bank soil and sediment would be removed using data collected and analyzed by a different consultant (Arcadis) and laboratory (Test America) in 2012 and 2013. Following completion of PDI sampling and analysis of those samples, which was completed by the lab in question in 2016 and 2017, the removal footprint was re-designed and the TCRA was implemented. The Final Report for the Area 3 TCRA states that a total volume of 34,073 yd³ was removed.
- An Action Memorandum for a TCRA in Area 4 was issued in April 2019 and assumed a total volume of 180,000 yd³ of PCB contaminated bank soil and sediment would be removed based data collected and analyzed by Georgia-Pacific and the laboratory in question (Pace) in 2014 and 2015. The PDI concluded that the extent of PCB-contaminated sediments within the reduced TCRA footprint (including materials >50 ppm is more pervasive, laterally and vertically, and the concentrations observed are generally higher than what was anticipated in the SRI. The removal footprint was re-designed following collection of the PDI samples, and the total estimated volume for removal in the reduced sediment footprint is 320,000 yd³ plus an unknown, but substantial additional volume of bank soil.
- **GP/ARCADIS 2012 Area 1 SRI Report.** “PCB concentrations in samples collected at sediment transect locations in 2000 (four focused samples) and 2007/2009 (189 samples) ranged from non- detect to 320 mg/kg (at CVT-07-01 [17-24 inches]) with a median PCB concentration of 5.2 mg/kg. PCB concentrations in approximately 19% (37 of 193) of sediment samples collected within the side channel were less than 1.0 mg/kg, while approximately 12% (23 of 193) exceeded 50 mg/kg PCB. All PCB concentrations greater than 50 mg/kg occurred in the subsurface intervals. PCBs are disproportionately located in areas where these fine-grained sediments have accumulated over time, particularly in the upper portion of the side channel between Transects CVT-08 (river mile 0.18) and CVT-05 (river mile 0.11).”
- **GP/Wood 2018 Area 1 PDI Report.** “Historical data collected in the Crown Vantage side channel indicated elevated sediment PCB concentrations at depths from the surface to greater than 24 inches throughout the side channel, particularly in the northern (downstream) portion (Figures 2-4f and 3-4f). Results from the PDI investigation indicate PCB concentrations below 1 mg/kg (including non-detects) for 89 of the 123 samples. The maximum PCB concentration is 45.1 mg/kg in Interval 3 at A1-SED-CV10. No 2017 sample in this area exceeded 50 mg/kg. The elevated PCB concentrations in the side channel is limited to the top 24 inches of sediment, except for location CV04 where elevated PCB concentrations extend to a depth of at least 33 inches (refusal).”

Human Health Risk Assessment – TPCB and TTEQ

- TPCB HHRA
 - TPCB RBCs for recreationalists developed and detailed in 2003 HHRA and the PRG being proposed is based on the site-specific HHRA
 - TPCB criteria based on 2003 assumptions= 23 ppm
 - TPCB criteria based on updated assumptions= 6 ppm
- TTEQ HHRA
 - TTEQ RBCs for recreationalists not previously developed and 990 ppt PRG being proposed is EGLE's generic nonresidential CUL for soil.
 - TTEQ criteria based on 2003 assumptions= 400 ppt
 - TTEQ based on updated assumptions= 350 ppt
- Discussions with MDNR suggest that an appropriate exposure area (“homerange”) for recreationalists might be on the order of a quarter-acre to a half-acre in size based on the current management and use of the property, which is substantially smaller than the 2 acre exposure area proposed.
 - Public lands that are part of the Allegan State Game Area and managed by MDNR
 - Current uses include but are not limited to hunting and trapping, as well as fishing from the riverbanks.

TTEQ Terrestrial Baseline Ecological Risk Assessment

- Mammals
 - Proposed PRG = 1,000 ppt
 - RBC range in TBERA = 91 ppt to >55,000 ppt
 - Protective RBC range = 91 ppt to 1,189 ppt (Murray)
- Birds
 - Proposed PRG = 7,000 ppt
 - RBC range in TBERA = 181 ppt to >114,000 ppt
 - LOAEL-based, so adverse impacts are likely.
 - Alternative views of RBCs
 - EGLE re-evaluation of Nosek = 181 ppt to 925 ppt
 - NOAEL-based approach (same approach as mammals) = 375 ppt.
- Remaining Issues w/ TBERA
 - *EGLE is unable to reproduce calculations in the TBERA and RPs are unwilling to provide unlocked/functional copies of key calculations.
 - For transparency and to facilitate review of the TBERA, unlocked/functional copies must be provided.
 - The bioaccumulation factor (BAF) that is used was developed based on two samples from a site in Sonford, MS, and was developed through a complex set of data manipulations and appears to be too low.
 - BAF is a very sensitive parameter in TBERA that should be based on site-specific data.